

REMARKS

Applicant thanks the Examiner for a thorough examination of the present application, but respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 5 and 15 are requested to be cancelled. Claims 1, 11, and 18 are currently being amended. After amending the claims as set forth above, claims 1-4, 6-14, and 16-20 are now pending in this application.

In light of the Examiner's consideration of Applicant's arguments filed March 19, 2008, new grounds of rejection have been asserted. Claims 1-2, 4-7, 10-12, 14-16, and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2002/0018086 to Kao et al. (Kao) in view of U.S. Patent No. 6,871,934 to Masuyama et al. (Masuyama). Applicant respectfully traverses the rejection for the reasons set forth below.

Although Applicant has further amended the claims in the interest of compact prosecution, Applicant respectfully submits that the combination of Kao and Masuyama is improper because Kao teaches away from the concepts discussed in Masuyama. Kao teaches an ink jet print head that has heating elements corresponding to each ink jet cell. (*see, e.g.*, Abstract and Col. 2, lines 58-67). In particular, a driving circuit is provided that "selectively drives the heating elements to provide energy to the corresponding ink jet cells and to heat the ink jet cells according to printing data from the printing device." (Col. 2, lines 62-65). Each ink jet cell has a threshold associated with it and "[w]hen supplied energy is greater than a threshold, inkdrops are jetted from the nozzles onto the medium." (Col. 2, line 67-Col. 3, line 1). More specifically, Kao teaches the use of a "first driving signal" and a "second driving signal." "The first driving signal drives a corresponding first set of heating elements of the first set of nozzles with an energy *greater* than the threshold to heat a corresponding first set of printing cells, *so that ink is jetted from the first set of nozzles.*" (Col. 3, lines 4-10; emphasis added). "The second driving signal drives a corresponding second set of heating elements with an energy *less* than the threshold, so that a corresponding second set of *ink jets cells are heated without jetting ink drops.*" (Col. 3, lines 11-15; emphasis added). Thus, Kao relates to a method of keeping ink jet cells heated wherein "thermal accumulation conditions of different inkjet cells are similar, and the ink jet cells are thus capable of jetting ink drops of

uniform sizes to achieve better printing quality.” (Col. 3, lines 15-18; emphasis added). In other words, Kao teaches a method that heats all ink jet cells so that the ink jet cells being used and the ink jet cells not being used are in a similar condition. Therefore, an ink jet cell that has not been used for a period of time can output ink that is of equal quality to that of an ink jet cell that has been recently used.

In contrast to the teachings of Kao, Masuyama teaches a concept of dispensing/discarding ink from unused nozzles prior to use. (*See, e.g.*, abstract, col. 2, lines 59-63, col. 3 lines 14-16, and col. 3, lines 23-27). Masuyama teaches that dispensing ink from these nozzles is beneficial because it enables these unused nozzles to eject ink stably when used in their first scan. (*See, e.g.*, Col. 3, lines 25-27). In other words, stale ink is ejected or discarded from the unused nozzle so that unused nozzles can perform equal to a nozzle that has been active.

Applicant respectfully submits that the teaching of Masuyama contradicts the teaching of Kao inasmuch as Kao teaches the concept of heating up all nozzles so that *every* nozzle is ready to jet ink in an equal, stable, and uniform manner. As such, a nozzle that has not been recently active, can produce ink in a manner uniform to that of an active nozzle. Therefore, there would be no reason to make any nozzle in Kao eject or discard ink prior to use, as taught by Masuyama. In other words, it would not be logical to apply the ink discarding method of Masuyama to the teachings of Kao because the nozzles of Kao are configured (*i.e.*, heated) in a manner that does not require ink to be discarded prior to use. If such a teaching were applied to Kao, ink would be discarded for no reason or benefit. Such a waste of ink would contradict the benefit gained from Kao’s teachings, as well as increase the costs associated with printing. Furthermore, such a combination would decrease the longevity of an ink cartridge due to the wasted ink.

For at least the reasons discussed above, Applicant submits that the combination of Kao and Masuyama is improper and should be withdrawn. Furthermore, Applicant submits that the rejection should be withdrawn because, in the interest of advancing prosecution, Applicant has amended independent claims 1 and 11 to further distinguish the claims from Kao and Masuyama. In particular, claim 1, as amended, recites in part that “each element

newly made available to the group is initially made available for use less frequently than the existing element(s).” Claim 11, as amended, recites in part: “the incremental printer being further arranged, when increasing the number of printing elements in subset of that group, to cause the one or more printing elements newly included in the subset to print for a predetermined duration at a frequency lower than that of one or more printing elements previously included in the subset.” Applicant respectfully submits that neither Kao nor Masuyama, alone and in combination, teaches or even suggests such a feature.

As discussed above, Kao teaches that if a first set of nozzles receive a first driving signal that is greater than a threshold, the first set of nozzles jet ink. (*See, e.g.*, col. 3, lines 4-10). Kao further teaches that if a second set of nozzles receive a second driving signal that is less than a threshold, the second set of nozzles do not jet ink. (*See, e.g.*, col. 3, lines 11-15). However, there is no teaching in Kao that relates to initially making the “new” nozzles available for use less frequently than existing nozzles, as required by the claims. Instead, Kao teaches that once a nozzle is given the first signal (i.e., above the threshold) that nozzle will be used at an *equal* frequency as an existing nozzle. As such, Applicant respectfully submits that Kao fails to teach or suggest the features required by claims 1 and 11.

Applicant notes that the Examiner asserted on page 7 of the Office Action that Kao “inherently” taught this feature. Specifically, the Examiner stated:

[i]nherently for those nozzles that receive signal 1 for the first time relative to those nozzles that already received signal 1 at least once, the nozzles that had just received signal 1 for the first time are less frequently use [sic] than the nozzles that already received signal 1 at least once.

In support of this assertion, the Examiner cited Col. 5, lines 1-28. Applicant has carefully examined the cited portion of text and cannot find any support whatsoever for such an assertion. The cited portion of text merely discusses that the first driving signal has a higher voltage than the second driving signal in order to breach the predetermined threshold to enable ink to be jetted. Thus, the rejection is not supported by the text of Kao. With regard to the inherency argument, Applicant submits that it is *not* inherent that an ink jet that receives ink for the first time will be used less frequently than an ink jet that has already

received signal 1. In contrast, Applicant submits that an ink jet that receives signal 1 for the first time will be used with the same frequency of an ink jet that has already received signal 1. This is because Kao teaches keeping all the ink jets heated. (*see, e.g.*, Abstract, Col. 2, lines 54-67, and Col. 3 lines 1-17). Since all the ink jets are heated, no warm up time is required. Thus, the moment that an ink jet receives signal 1, the inkjet will begin jetting in the same frequency as an inkjet that has already received signal 1. As such, Applicant respectfully submits that Kao fails to teach each and every element of claims 1 and 11.

With regard to the Masuyama reference, Masuyama teaches ejecting or discarding ink (prior to usage) from nozzles that have not been used yet. (*See, e.g.*, abstract; col. 2, lines 38-41 and lines 59-63; col. 3, lines 13-17 and 23-27). Once the ink is ejected, the new nozzles are used in the *same* frequency as the nozzles previously in use. Figure 4 exemplifies this by clearly depicting that the new nozzles are used in the same frequency as the nozzles previously in use. With regard to Figure 4, Masuyama states:

With the front end area printing completed at the (N)th scan, the transition area begins to be printed at an (N+1)st scan with a normal line feed distance. More specifically, starting from the (N+1)st scan, the line feed distance is increased to four nozzles. Therefore, nozzle No. 5 to 7 (marked with X), which have not been used up to the (N)th scan, are now used. At the (N+1)st scan, only the nozzles of No. 5 - 7 are subjected to the preliminary ejection prior to this scan. Next, at the (N+2)nd scan, since the nozzles of No. 8 - 10 were kept out of use in the preceding scans, these nozzles undergo the preliminary ejection prior to this scan. In this way, the preliminary ejection prior to the associated scan is continued until (N+4)th scan, at which time a nozzle of No. 16 begins to be used. That is, since in each of the (N+1)st to (N+4)th scan, there are nozzles which have been kept out of use in the preceding scans but begin to be used in the current scan, these nozzles are subjected to the preliminary ejection prior to the start of the associated scan to make them ready to perform ejection in good condition. (Col. 5, line 59- col. 6, line 19; emphasis added).

Accordingly, Masuyama teaches conducting “preliminary ejecting prior to the scan.” However, once this preliminary ejection is conducted, the nozzle is used in the same frequency as the other nozzles. There is no teaching or even a suggestion related to using the

new nozzles less frequently than the other nozzles. In fact, using the nozzles less frequently would be counter-intuitive to the teachings of Masuyama, since Masuyama teaches preliminary ejecting so that the new nozzles are “ready to perform ejection in good condition.” Since Masuyama teaches that the nozzles are “ready to perform in good condition,” there would be no need to use the nozzle at a frequency less than the other nozzles. In other words, there is no need to use a nozzle less frequently if the nozzle is in a condition comparable to the other active nozzles.

Applicant notes that the Examiner asserted on page 5 of the Office Action that Masuyama reads on such a feature. In particular, the Examiner asserted: “Fig. 4, for example Scan Pass N+1, nozzles 1-4 had already been used 5 times when nozzles 5-7 are used only once.” Applicant respectfully submits that the Examiner is misinterpreting the claim. Although the Examiner is correct in stating that at scan pass N+1, nozzles 1-4 had already been used 5 times and nozzles 5-7 had only been used once, such a teaching does not relate to the requirements of the claims. For example, claim 1, as amended, recites that “each element newly made available to the group is initially made available for use less frequently than the existing element(s).” (Emphasis added). In other words, once a nozzle is introduced to the printing group, that nozzle is used less frequently than the other nozzles previously in use. In contrast to this requirement, Masuyama clearly depicts that once nozzles 5-7 have been introduced, nozzles 5-7 are used at the *same* frequency as nozzles 1-4. Specifically, in scan passes (N+1) – (N+5), nozzles 1-4 and nozzles 5-7 are both used at the same frequency. Applicant respectfully submits that the Examiner may better understand this difference by comparing Figure 3 of the present application to figure 4 of Masuyama. Should the Examiner have any questions concerning this issue, the Examiner is encouraged to contact the undersigned at his earliest convenience.

With regard to claims 4 and 14, the Examiner asserted that Kao teaches “the number of elements in the group available to print is increased as a function of the number of firing pulses sent to elements of the group,” as recited in claim 4 and similarly recited in claim 14. Specifically, the Examiner stated on page 4 of the Office Action that “[a]s it can be observed, the number of nozzles or inkjets available for ejecting ink is a function of signal 1. The more nozzles that receive signal 1, the more nozzles are available for printing.” Applicant

respectfully disagrees. While Kao does teach that the number of ink jets that receive signal 1 is proportional to the number of ink jets that dispense ink, Kao fails to teach or even suggest that “the group available to print is increased as a function of the number of firing pulse,” as recited in claim 4. (Emphasis added). In Kao, *all* of the ink jets are “available” to print. However, only a certain number of ink jets are used based on the received input signal. Accordingly, Kao does not teach increasing the number of “available” ink jets, since *all* the ink jets in Kao are already available for printing. Furthermore, Kao fails to discuss anything related to analyzing the total “number of firing pulses” in order to increase the number of available ink jets. As such, Applicant respectfully submits that Kao fails to teach each and every element of claims 4 and 14.

Claims 3, 9, 13, 17, 19, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao in view Masuyama and further in view of U.S. Patent No. 6,260,940 to Yamada et al. (Yamada). In addition, claims 8 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao in view Masuyama and further in view of U.S. Patent No. 5,864,351 to Silverbrook (Silverbrook). Additionally, claim 20 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao in view Masuyama and in view of Silverbrook and further in view of Yamada.

Applicant notes that these remaining prior art references were directed to specific limitations recited in the remaining dependent claims of the present application. However, each of these dependent claims include at least one of the deficiencies discussed above with regard to the independent claims and Applicant submits that none of these remaining prior art references cure the deficiencies discussed above.

Because the reference cited by the Examiner fails to teach all of the required features of independent claims 1 and 11, Applicant submits that each of these independent claims are patentable over these reference. Furthermore, because dependent claims 2- 4, 6-10, 12-14, and 16-20 are each directly or indirectly dependent upon independent claims 1 and 11, Applicant submits that each of these claims are allowable for at least the same reasons as discussed above, in addition to the reasons discussed with regard to dependent claims 4 and 14.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 08-2025. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 08-2025. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 08-2025.

Respectfully submitted,

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HEWLETT-PACKARD CO.
Customer Number: 22879

By 

M. Aamir Haq
Attorney for Applicant
Registration No. 61,092
Telephone: (202) 672-5394